

# PATENT SPECIFICATION

DRAWINGS ATTACHED

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## COMPLETE SPECIFICATION

### Apparatus for Propagating and Promoting Growth of Plants

I, LESLIE ETHELBERG RUTHVEN MURRAY, a British Subject of 17, Retreat Close, Kenton, Middlesex, do hereby declare the invention for which I pray that a patent may be granted to me, and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention relates to apparatus for propagating and promoting growth of plants.

It is well known, in conventional apparatus, such as green-houses and the like, to provide in an enclosed space an artificial source of heat for increasing the ambient temperature of plants and to provide an artificial source of water vapour for increasing the ambient humidity of the plants. Usually, the space enclosure is of glass or similar material which allows heat and light from the sun to reach the plants and the aforesaid artificial sources augment the heat and light from the sun. Particular disadvantages of such conventional apparatus arise from the difficulty and/or expense of controlling the operation of said artificial sources so that, regardless of conditions external to the enclosure, the ambient temperature and humidity of the plants are substantially those required for efficient propagation and growth of the plants.

Furthermore, as is well known, the generation of light results in the generation of heat and thus, as between the hours of darkness and the hours of light, the ambient temperature and humidity of the plants will be further varied by the effects of the sun's rays or by sources of artificial light provided in the enclosure.

The principal object of the present invention is to provide an apparatus for the propagation and promotion of growth of plants which substantially overcomes the aforementioned disadvantages in a convenient, simple and economical manner.

According to the present invention, there is provided an apparatus for propagating and promoting growth of plants comprising an enclosure provided with plant supporting means,

controllable illuminating means located within said enclosure and serving as an artificial source of light for plants placed on the supporting means, an open-topped liquid container situated below the supporting means, means for evaporating liquid from said container whereby vapour may be caused to flow upwardly within the enclosure and about the supporting means and means for controlling the rate of evaporation of said liquid.

According to one feature of the invention, control of the rate of evaporation is dependent, at least in part, upon the control of said illuminating means.

In order that the invention may be more clearly understood, one embodiment thereof will now be described, by way of example, only, with reference to the accompanying drawing in which:—

Figure 1 shows a side-elevation, and

Figure 2 shows a vertical cross-section of the embodiment, the side panels of which, in both figures, are assumed to be removed or transparent.

Referring to the drawing, a cabinet 1 comprises a main framework of vertical members 2 and horizontal members such as 3. The framework is adapted to retain panels, of any suitable material, which are dimensioned so as to cover the vertical sides of the framework.

When the cabinet is situated so as to be shielded from the sun's rays, the panel material is preferably transparent, thereby facilitating observation of the cabinet interior. Alternatively, the panel material could be opaque.

Each panel may be large enough to cover a particular side of the cabinet or smaller panels may be used and retained between adjacent horizontal framework members. Preferably, members 2 and 3 are of metal and of angular cross-section. To complete the enclosure, a base panel 4 is provided near the bottom of the cabinet and a roof 5 is supported by the upper ends of the members 3.

For obtaining access to the cabinet, one or more of the side panels can be removed, either by sliding or on hinges.

5 Extending the length of the cabinet are a water-tight tray 6 and further water-tight trays 7. These trays are supported on angle-sectioned members, such as 8, and preferably one or more of the cabinet end panels is removable to allow the trays to be slid in and  
10 out of the cabinet. Plants to be cultivated are placed on the trays and extended into the spaces above the trays, the plants normally being in pots and the latter standing on stands (not shown) which support the pots  
15 above the surface of water contained in the trays. Tubular lamps 9 are mounted above the trays and are provided with reflectors 10 adapted to direct light from the lamps downwardly onto the tray beneath. Each reflector  
20 is provided with a pair of longitudinal flanges 11 adapted to receive a coloured light filter (not shown) e.g. a sheet of coloured glass whereby the light reaching the plants is coloured, with resulting effects in the plants  
25 which are well known *per se*.

The lower space or compartment 12 of the cabinet, formed by the base member 4, the vertical cabinet sides and underside of the tray 6, contains a heating element 13. Said element  
30 extends substantially the length of the compartment and is supported by clamps 14 rigidly mounted on a rotatable rod 15. Said rod protrudes through one end of the compartment to form a lever 16 and is mounted  
35 in adjustable friction bearings located at each end of the compartment, the bearings being adjusted so that the rod may be rotationally and positively positioned by deflection of lever 16. Operation of the lever moves the heating  
40 element 13 in an arc about the rod 15 and thus towards, or away from, the tray 6. In order to offset the torque in rod 15 produced by the weight of the heating element, a counter weight 17 is rigidly attached to said rod,  
45 diametrically opposite the heating element. The heating element may be of any suitable kind and is connected to an external source of energy by a flexible coupling (not shown). Thermostats (also not shown) are arranged in  
50 the cabinet and adapted to control the flow of energy from the external source to the heating element so that the cabinet temperature shall remain within predetermined allowable limits.

55 Tray 6 is dimensioned so that, apart from two longitudinal apertures 18 on either side of the tray, compartment 12 is substantially sealed from the remainder of the cabinet. Hinged ventilator flaps 19 are mounted to  
60 cover apertures 18 and are positioned by levers 20 which pass through the sides of the cabinet. The circulation of external air within the cabinet is controlled by a ventilation flap 21 provided in the base member 4 and a pair  
65 of ventilating flaps 22 located in the cabinet

roof.

With the apparatus as so far described, it will be seen that, with energy supplied to the heating element, heat will transfer from the  
70 element to tray 6 and thereby evaporate the water contained in said tray. The rate of evaporation will depend, substantially, upon the distance of the heating element from the tray. Thus, by varying this distance, the rate  
75 of evaporation and therefore the relative humidity of the atmosphere within the cabinet, can be varied. Control of cabinet temperature is obtained by appropriate settings of the thermostat and ventilators, in particular, flaps  
80 19. In this respect it will be noticed that the humidity of the cabinet atmosphere can be varied without directly affecting the temperature, as the amount of heat conveyed from the heating element through apertures 18 is  
85 substantially independent of the position of said element.

In order to obtain automatic change of cabinet temperature and humidity in dependence upon whether the cabinet is illuminated or not, a subsidiary heating means 23, adjustable in position, and mounted in a similar  
90 manner to heating element 13, is carried by a clamp 24 on a rod 25 having a lever 26 and a counter-weight 27. The heating means 23 is arranged to be connected to its source of energy when lamps 9 are lit and to be disconnected when said lamps are extinguished.  
95 As shown in the drawing, a most convenient arrangement is obtainable when lamps 9 are of a kind necessitating the use of a so-called "control unit" e.g. fluorescent lamps. In this case, heating means 23 comprises the lamp control units 28, the chokes and/or ballast  
100 lamps of which produce sufficient heat to cause the desired change in temperature and humidity. Evaporation also occurs from trays 7 due, *inter alia* to the heat from lamps 9.

#### WHAT WE CLAIM IS:—

1. An apparatus for propagating and promoting growth of plants comprising an enclosure provided with plant supporting means, controllable illuminating means located within said enclosure and serving as an artificial source of light for plants placed on the supporting means, an open-topped liquid container situated below the supporting means, means for evaporating liquid from said container whereby vapour may be caused to flow upwardly within the enclosure and about the supporting means, and means for controlling the rate of evaporation of said liquid. 110
2. An apparatus as claimed in claim 1, wherein control of the rate of evaporation of said liquid is at least partially dependent upon the control of the illuminating means. 115
3. An apparatus as claimed in either of claims 1 or 2 wherein said evaporating means is contained within a compartment of said enclosure. 120
4. An apparatus according to any one of the 125 130

- preceding claims wherein said evaporating means comprises a first source of heat adapted to operate independently of said illuminating means and a second source of heat adapted to operate in dependence upon the operation of said illuminating means.
- 5 5. An apparatus as claimed in claim 4 wherein either or both of said sources of heat are positionally adjustable in relation to said liquid containing means.
- 10 6. An apparatus as claimed in any one of the preceding claims wherein said enclosure is provided with ventilating means for controlling ingress to and egress from the enclosure of external air.
- 15 7. An apparatus as claimed in claim 3 and any claim dependent therefrom wherein said compartment is provided with means for controlling air flow between said compartment and the remainder of said enclosure.
- 20 8. An apparatus as claimed in any of the preceding claims wherein said illuminating means are provided with light reflectors, said reflectors being adapted to retain light filters.
- 25 9. An apparatus as claimed in claim 4 and any claim dependent therefrom, wherein said illuminating means operates in conjunction with a heat-generating unit and said second source of heat comprises said heat-generating unit.
- 30 10. An apparatus as claimed in claim 9, wherein said heat-generating unit is a control unit associated with said illuminating means.
- 35 11. An apparatus as claimed in any one of the preceding claims comprising further open-topped liquid containers, wherein said illuminating means are adapted to evaporate liquid from said further liquid containers.
- 40 12. An apparatus as claimed in any one of the preceding claims wherein said liquid containers are removable from said enclosure.
- 45 13. Apparatus for propagating and promoting growth of plants constructed, arranged and adapted to operate substantially as herein described with reference to the accompanying drawing.

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1 SHEET

COMPLETE SPECIFICATION

This drawing is a reproduction of  
the Original on a reduced scale.

